

REMARKS

Reconsideration of this application is respectfully requested. Claims 1-16 are pending in the application. Claims 12 and 16 have been cancelled without prejudice or disclaimer. Claims 1, 2, 5, 6, 9, and 13 have been amended. Claims 1-11 and 13-15 are currently at issue.

Claim Amendments

Claims 2, 6, and 13 have been amended to correct typographical errors. Claims 1, 5 and 9 have been amended to recite a cyclic ester oligomer and a clay in a ratio of 100:0.1 - 3 by weight. Support for this amendment can be found on page 3, Example 2, lines 8-11 and 21-24 of the specification. Claim 9 has also been amended to recite the limitation called for in dependent claim 16. No new matter has been added by these amendments.

Rejections Under 35 U.S.C. § 102(b) Anticipation

In section 1 of the Action, the Examiner has rejected claims 1-4 under 35 U.S.C. § 102 as anticipated by Takekoshi *et al.* US 5,530,052 (Takekoshi '052). The Examiner asserts that Takekoshi '052 discloses compositions which are nanocomposites comprising a layered clay and macrocyclic oligomers including poly(ethylene terephthalate), poly(butylene terephthalate) and poly(ethylene-2,6'-naphthalenedicarboxylate) where the oligomer is polymerized with no more than 20 wt % layered clay.

While Takekoshi '052 does disclose "no more than about 20% by weight layered mineral based on total weight of the composition," Takekoshi '052 discloses only compositions containing 4%, 5%, and 15% layered mineral by weight. Amended claim 1 recites a cyclic ester oligomer and a clay in a ratio of 100:0.1 - 3 by weight. This ratio is not disclosed by Takekoshi '052. Furthermore, the ratio directed by the claims of the present invention led to an unexpected result, *i.e.* a separation of layers between the clay of 50 nm or more (*See* page 7, lines 2-7 and page 11, lines 21-25 of the specification). This separation is beneficial because it provides a polyester/clay nanocomposite with a well dispersed clay and completely separate silicate layers, leading to material with improved mechanical strength and thermal and electrical properties (*See*, for example,

page 7, lines 2-7 and page 12, lines 5-15). Takekoshi '052 neither teaches the claimed ratio, nor teaches that such a range would lead to the observed separation of layers.

Therefore, Takekoshi '052 does not anticipate claim 1 of the present invention. Claims 2-4 depend from claim 1, and therefore are also not anticipated by Takekoshi '052. In view of the above amendments and remarks it is requested that the Examiner withdraw the rejection of claims 1-4 for anticipation.

Rejections Under 35 U.S.C. § 102(b) Anticipation or § 103(a) Obviousness

In section 2 of the Action, the Examiner has rejected claims 5-10 and 12-15 under 35 U.S.C. § 102(b) as anticipated by Takekoshi '052 or under 35 U.S.C. § 103(a) as obvious over Takekoshi '052. The Examiner asserts that while Takekoshi '052 fails to disclose a distance of 50 nm or more between layers, it is considered that the layers of clay in Takekoshi '052 are inherently at least 50 nm given that it discloses nanocomposites and a method of polymerization of cyclic polymers like those called for in the present claims.

Takekoshi '052 neither discloses a cyclic ester oligomer/clay ratio below 4 wt %, nor teaches that a low weight percent in clay produces a separation effect of 50 nm or more. The properties of the polyester/clay nanocomposite of the present invention, as called for in claim 5 and prepared as called for in claim 9, are improved over Takekoshi '052 by having a distance between layers of clay of 50 nm or more despite comprising a smaller amount of clay (≤ 3 wt %).

The Examiner further asserts that it would have been obvious to one of ordinary skill in the art to obtain a nanocomposite with at least a 50 nm spacing of clay given that Takekoshi '052 discloses nanocomposites and a method of polymerization of cyclic oligomers.

The methods for preparing plastic materials in the prior art, including Takekoshi '052, comprise the separate steps of plastic polymerization, followed by shape processing using an injection molding machine or an extruder. The method directed by amended claim 9 comprises a polymerization of a cyclic ester oligomer and a clay that is carried out in a single step using reactive extrusion or reaction injection molding. Therefore, the polymerization process directed by claim 9

is an improved method for preparing improved plastic materials in conventional processing machines, without the need for modification of the processing machines.

Furthermore, the polymerization process disclosed by Takekoshi '052 is performed in a reaction flask, while the polymerization process directed by claim 9 is carried out under high shear force. Therefore, the process directed by claim 9 of the present invention is inherently different from the process disclosed by Takekoshi '052. In addition, the process of the present invention is expected to yield a higher polymerization rate and degree of polymerization, even at relatively lower polymerization temperatures, thus providing a nanocomposite having a higher molecular weight and an improved degree of dispersion of filler over the methods disclosed in the prior art.

Therefore, Takekoshi '052 neither teaches nor makes obvious the nanocomposite called for in claim 5, or the process of making the nanocomposite called for in claim 9. Claims 6-8 depend from claim 5, and claims 10, 11, and 13-15 depend from claim 9. Therefore, these claims are also not anticipated by, or obvious over, Takekoshi '052. In view of the above amendments and remarks, it is requested that the Examiner withdraw the rejection of claims 5-10 and 13-15 for anticipation or obviousness.

Rejections Under 35 U.S.C. § 103(a) Obviousness

In section 3 of the Action, the Examiner has rejected claim 11 under 35 U.S.C. § 103(a) as obvious over Takekoshi '052. The Examiner asserts that while Takekoshi '052 does not disclose a polymerization time of 5 - 10 minutes, it would have been obvious to one of ordinary skill in the art to utilize suitable polymerization times in order to obtain full polymerization.

The method of claim 11 depends from claim 9, and as described above, Takekoshi '052 neither discloses nor suggests the method directed by claim 9 of the present invention. Therefore, a polymerization time of 5 to 10 minutes would not have been obvious to one of ordinary skill in the art based on the disclosure of Takekoshi '052. The Examiner is therefore respectfully requested to withdraw the rejection of claim 11 for obviousness.

In section 4 of the Action, the Examiner has also rejected claim 11 under 35 U.S.C. § 103(a) as obvious over Takekoshi '052 in view of Takekoshi *et al.* U.S. Patent 6,960,626

(Takekoshi '626). The Examiner asserts that Takekoshi '626 discloses a macrocyclic oligomer polymerized with a magnesium silicate and teaches that the mixture is well-suitable to low pressure processes including reaction injection molding. The Examiner further asserts that it would have been obvious to one of ordinary skill in the art to polymerize the cyclic oligomer and layered clay of Takekoshi '052 in reaction injection molding.

While the Examiner has rejected claim 11, only claim 16 of the present invention is directed to reaction injection molding. Claim 16 has been cancelled by the amendments described above and reaction injection molding is presently directed by amended claim 9.

It is respectfully submitted that Takekoshi '626 is not available as prior art against the present application. The present application was filed on February 20, 2004. Takekoshi '626 was filed after this date, on June 2, 2004, and was not published until November 11, 2004. Takekoshi '626 does claim priority to an earlier patent, U.S. Patent 6,639,009 to Winckler and Takekoshi (Winckler '009) filed on July 15, 2002. However, Winckler '009 does not disclose "injection molding." Therefore, the disclosure of reaction injection molding in Takekoshi '626 is not entitled to the Winckler '009 priority date, and Takekoshi '626 is therefore not available as prior art against the claims of the present application. It is respectfully requested that the Examiner withdraw this ground for rejection.

In view of the preceding comments and amendments, the pending claims are believed to be in condition for allowance and such action is earnestly solicited.

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